भारतीय मानक
Indian Standard

IS 17355 : 2020

कृषि वस्त्रादि — कृषि और बागवानी प्रयोजनों के लिए पोलीप्रोपाइलिन स्पन बोंडेड बिना बुनी हुई खरपतवार दमन दरी — विशिष्टि

Agro Textiles — Polypropylene Spun Bonded Non-Woven Mulch Mat for Agricultural and Horticultural Applications — Specification

ICS 59.080.70; 65.020.20

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January 2020 **Price Group 4**

Technical Textiles for Agro-tech Sectional Committee, TXD 35

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Technical Textiles for Agro-tech Sectional Committee had been approved by the Textile Division Council.

Non-woven mulch mat are made from polypropylene by spinning the material into fine filaments and bonding them by heat without use of any binders. These mats do not allow the light to pass through the plane of the fabric and help suppress weed growth effectively without use of chemical weedicides. These are, however, permeable to water, air and fertilizers to ensure supply of necessary nutrients to the plants. The non-woven mulches are lighter in weight, easy to install and helps to retain soil humidity at a conducive level.

The composition of the Committee responsible for the formulation of this standard is given in Annex D.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

AGRO TEXTILES — POLYPROPYLENE SPUN BONDED NON-WOVEN MULCH MAT FOR AGRICULTURAL AND HORTICULTURAL APPLICATIONS — SPECIFICATION

1 SCOPE

This standard prescribes the requirements for polypropylene spun bonded non-woven mulch mat used for weed control in agricultural and horticultural applications.

2 REFERENCES

The standards listed in Annex A contain provisions, which through reference in this text, constitute provision of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated in Annex A.

3 TERMINOLOGY

For the purpose of this standard the definitions given in IS 16366 shall apply.

4 TYPES

Based on the mass, mulch mat are of following types:

a) *Type 1* . — Mulch mat of minimum 50 g/m²

b) *Type 2* . — Mulch mat of minimum 70 g/m²

5 CONDITIONING AND TESTING

The mulch mat shall be conditioned and tested in the standard atmosphere of 27 ± 2 °C and relative humidity of 65 ± 2 percent as per the method prescribed in IS 6359 and then tested in this standard atmosphere.

6 REQUIREMENTS

6.1 The polypropylene spun bonded non-woven mulch mat shall conform to the requirements as specified in Table 1.

7 PACKING AND MARKING

7.1 Packing

The mulch mat shall be packed in rolls of 300 m in length or as agreed to between the buyer and the seller in polyethylene film of minimum thickness of 40 microns and suitably secured.

7.2 Marking

Each roll of mulch mat shall be marked with a suitable colour at every one meter conforming to IS 9833 in indelible ink by printing with the following information:

a) Name of the material that is polypropylene non-woven spun bonded mulch mat;

b) Identification and source of manufacture;

c) Length and width, in m;

d) Type and mass, in g/m^2;

e) Batch No. and month and year of manufacture; and

f) Any other information as required by the buyer or the law in force.

7.3 BIS Certification Marking

The mulch mat rolls conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed thereunder, and the mulch mat rolls may be marked with the Standard Mark.

8 SAMPLING AND CRITERIA FOR CONFORMITY

8.1 Lot

All the rolls of the same construction delivered to a buyer against one dispatch note shall constitute a lot.

8.2 Random samples shall be drawn from the lot for testing so as to be representative of the lot. The conformity of a lot to the requirements of this standard shall be determined on the basis of the tests carried out on the samples selected from it.

8.3 Unless otherwise agreed to between the buyer and the seller, the number of rolls to be selected at random from a lot shall be as given in column 3 or column 4 of Table 2. A roll shall be declared non-conforming if it does not meet any of the requirements as specified in Table 1.

8.4 The number of test samples and criteria for conformity of a lot for various requirements shall be as given in Table 3.

Table 1 Requirements of Non-woven Polypropylene Spun-bonded Mulch Mat

(*Clauses* 6.1 and 8.3)

Sl No.	Characteristic	Requirement		Method of Test, Ref to
		Type 1	Type 2	
(1)	(2)	(3)	(4)	(5)
i)	Length, m, *Min*	← 300 or as agreed →		IS 1954
ii)	Width, m	← 3.2 or as agreed with ± 1cm →		IS 1954
iii)	Mass, g/m² , *Min*	50	70	IS 15891 (Part 1)
iv)	Thickness, mm, *Min*	0.38	0.45	IS 15891 (Part 2) (By Method A)
v)	Tensile strength, N/5 cm, *Min*:			IS 15891 (Part 3)
	a) Machine direction	85	115	
	b) Cross direction	60	80	
vi)	Elongation, percent:			IS 15891 (Part 3)
	a) Machine direction	← 60 to 110 →		
	b) Cross direction	← 60 to 110 →		
vii)	UV stability, retained strength after 144 h exposure, percent, *Min* (machine direction and cross direction)	50	50	Annex B
viii)	Colour	Black, white or as agreed		Visual
ix)	Ash content, percent, *Max*	1	1	Annex C
x)	Trapezoid tear strength, N, *Min*:			IS 15891 (Part 4)
	a) Machine direction	60	70	
	b) Cross direction	65	80	

Table 2 Scale of Sampling

(*Clause* 8.3)

Sl No.	Number of Rolls in the Lot	Sample Size (No. of Rolls)	Sub-Sample Size (No. of Rolls)	Permissible No. of Non-Conforming Rolls
(1)	(2)	(3)	(4)	(5)
(i)	Up to 50	5	2	0
(ii)	51 to 150	8	3	0
(iii)	151 to 300	13	5	1
(iv)	301 to 500	20	8	1
(v)	501 and above	32	12	2

Table 3 Number of Test Specimens and Criteria for Conformity

(*Clause* 8.4)

Sl No.	Characteristics	Number of Test Samples	Criteria for Conformity
(1)	(2)	(3)	(4)
i)	Length, width and thickness	No. of non-conforming rolls shall not exceed the corresponding value specified in column 5 of Table 2	The defective rolls do not exceed the corresponding number given in column 5 of Table 2
ii)	As specified in column 4 of Table 2	All the test specimens shall pass the tests	All the test specimens shall pass the tests

ANNEX A

(*Clause* 2)

LIST OF REFERRED INDIAN STANDARDS

IS No.	*Title*
1954 : 1990	Determination of length and width of woven fabrics — Methods (*second revision*)
6359 : 1971	Method for conditioning of textiles
9833 : 1981	List of pigments and colourants for use in plastics in contact with foodstuffs, pharmaceuticals and drinking water
15891	Textiles — Test methods for nonwovens
(Part 1) : 2011	Determination of mass per unit area
(Part 2) : 2011	Determination of thickness
(Part 3) : 2011	Determination of tensile strength and elongation
(Part 4) : 2011	Determination of tear resistance
16366 : 2015	Glossary of terms used in agrotextile

ANNEX B

[*Table* 1, *Sl No.* (vii)]

UV STABILITY TEST

B-1 TEST SPECIMENS

The test specimens for tensile strength shall be cut from the sample as specified in IS 15891 (Part 3).

B-2 TEST CONDITIONS

B-2.1 The test shall be carried out with fluorescent UV-B lamp (313 nanometer or its equivalent).

B-2.2 The duration of the test shall be 144 h (that is 6 days).

B-2.3 The test cycle shall be 8 h at 60 ± 3°C with UV radiation alternating after 4 h at 50 ± 3° C with condensation.

B-2.4 Irradiation level throughout the test shall be maintained at $0.63\,{}^{+0.03}_{-0.0}$ W/m^2.

B-3 TEST PROCEDURE

B-3.1 Determine the original average tensile strength of shade net specimens separately as per the test specified in IS 15891 (Part 3).

B-3.2 Expose the specimens alternately to ultraviolet light alone and to condensation in one respective cycle.

B-3.2.1 The type of fluorescent UV lamp, the timing of the UV exposure and the temperature of condensation shall be as specified in **B-2**.

B-3.3 Determine the average tensile strength of the specimens separately after UV exposure as mentioned above.

B-3.4 Determine the percent retention of original tensile strength as follows:

$$\text{Percent retention of original tensile strength} = \frac{b}{a} \times 100$$

where,

a = average tensile strength before UV exposure as obtained in **B-3.1**; and

b = average tensile strength after UV exposure as obtained in **B-3.3**.

NOTES:

1 The UV source is an array of fluorescent lamps (with lamp emission concentrated in the UV range).

2 Condensation is produced by exposing the test surface to a heated, saturated mixture of air and water vapors, while the reverse side of the test specimen is exposed to the cooling influence of ambient room air.

ANNEX C

[*Table* 1, *Sl No.* (ix)]

DETERMINATION OF ASH CONTENT

C-1 PRINCIPLE

The procedure is used to find out the inorganic residue in non-woven mulch mat sample by ashing it in a muffle furnace. A weighed amount of fabric sample is heated to 590°C. The polymer sample (organic portion) is burnt at 590°C until constant mass of inorganic matter is obtained. The residue (inorganic matter) is reported in terms of percentage ash content in a given sample.

C-2 APPARATUS

C-2.1 Weighing Balance, accurate to 0.001 g.

C-2.2 Silica Crucibles, sufficient volume to accommodate 3 g of sample in such a way that level of the sample after filling the crucible does not cross half the height of crucible.

C-2.3 Bunsen Burner

C-2.4 Silica Triangle and Tripod

C-2.5 Muffle Furnace, capable of being controlled thermostatically at 590 ± 10°C.

C-2.6 Desiccator, containing an effective drying agent (for example, silica gel) that does not react chemically with ash components.

C-2.7 Gloves and Crucible Holder

C-3 SAFETY

C-3.1 Burn the sample in an effectively ventilated hood.

C-3.2 Keep the hood closed and do not inhale the fumes of combustion.

C-3.3 Wear gloves and use sample (crucible) holder, to introduce crucible in the furnace.

C-3.4 Sample shall be folded properly to accommodate it in silica crucible.

C-4 PROCEDURE

C-4.1 Heat the clean crucible at 590 ± 10°C for 10 to 15 min and cool it in a desicator.

C-4.2 Weigh the empty crucible to nearest 0.001 g.

C-4.3 Weigh 3 g of non-woven mulch mat sample in the crucible (nearest to 0.001 g).

C-4.4 Heat the crucible directly on burner so that the sample burns slowly and loss of ash is avoided. Continue burning until no more smoke is evolved.

C-4.5 Transfer the crucible in the muffle furnace, which is already maintained at approximately 590°C and keep the crucible inside for about 2 h.

C-4.6 Remove the crucible from the furnace and cool it to the room temperature in a desicator. Weigh it and record the weight to accuracy of 0.001 g.

C-4.7 Keep the crucible in the muffle furnace for another 30 min, cool in a desicator and weigh again. Repeat the procedure until constant mass is obtained.

C-5 CALCULATION

$$\text{Percent ash content} = \frac{\text{Weight of ash} \times 100}{\text{Weight of non-woven mulch mat sample}}$$

ANNEX D

(*Foreword*)

COMMITTEE COMPOSITION

Technical Textiles for Agro-tech Sectional Committee, TXD 35

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This Indian Standard has been developed from Doc No.: TXD 35 (14875).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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Published by BIS, New Delhi